

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended) A method for controlling a pump station, that comprises at least two pumps, each of the at least two pumps being arranged to transfer liquid from or into a tank and being controlled by an electric drive comprising a frequency converter, the method comprising operating the at least two pumps in turns through the steps of:

- measuring a liquid surface level in the tank by means of a sensor,

- controlling activation of each of the two pumps on the basis of the measured liquid surface level,

- selecting a first value of the liquid surface level,

- selecting as a first value of pump rotation speed substantially a predetermined value at which an amount of transferred liquid relative to consumed energy is at maximum,

- detecting a first moment when the liquid surface level reaches said first value of the liquid surface level from a predetermined direction,

- controlling, as a consequence of the detection of the first moment, the pump rotation speed of one of said at least two pumps to said first value of the pump rotation speed,

- running the one of said at least two pumps at the first value of the pump rotation speed in order to move the liquid surface level in a direction opposite to the predetermined direction,

- detecting a second moment when the liquid surface level reaches, from the direction opposite to the predetermined direction, another value of the liquid surface level that is later in the direction opposite to the predetermined direction than the first value of the liquid surface level, and

- controlling, as a consequence of the detection of the second moment, the one of said at least two pumps to be stopped so as to keep the surface level between said first value and the other value of the liquid surface level, the change of amount of liquid in the tank when the surface level changes between said first value and the other value of the liquid surface level being smaller than the whole volume of the tank,

wherein said at least two pumps are controlled at the pump station in such a way that said at least two pumps are alternated in operating turns in which the pump rotation speed is said first value of the pump rotation speed and monitoring of the liquid surface level and the controlling of the pump rotation speeds are performed in the frequency converter.

2. (previously presented) A method as defined in claim 1, wherein the tank is filled by means of said at least two pumps at the pump station, said predetermined direction is from a top towards a bottom of the tank.

3. (previously presented) A method as defined in claim 1, wherein the tank is emptied by means of said at least two pumps at the pump station, said predetermined direction being from a bottom towards a top.

4. (currently amended) A method as defined in claim 1, wherein one of said at least two pumps is a currently operating pump, and the method further comprises selecting a second value of the pump rotation speed and detecting a moment at which the liquid surface level reaches a second value of the liquid surface level from said predetermined direction, and as a consequence of this detection, controlling the pump rotation speed of the currently operating pump to the second value of the pump rotation speed, the second value of the liquid surface level being later in the predetermined direction than the first value of the liquid surface level.

5. (previously presented) A method as defined in claim 4, wherein said second value of the pump rotation speed is the maximum rotation speed.

6. (canceled)

7. (currently amended) A method as defined in claim 4, wherein the method further comprises selecting a third value of the pump rotation speed, and detecting while a first pump, of said at least two pumps, is operating, a moment at which the liquid surface level reaches a third value of the liquid surface level from said predetermined direction, and activating as a consequence of this detection, a second pump, of said at least two pumps, that is not currently operating to operate at said third value of the pump rotation speed, the third value of the liquid surface level being later in the predetermined direction than the first value of the liquid surface level.

8. (previously presented) A method as defined in claim 1, wherein said first value of the liquid surface level and the first value of the pump rotation speed are stored in the frequency converter of the pump station.

9. (previously presented) A method as defined in claim 1, wherein said measurement of the liquid surface level is performed in the frequency converter on the basis of a signal received from a surface level sensor.

10. (previously presented) A method as defined in claim 1, wherein an alarm signal is received from an alarm sensor of each of the at least two pumps and the pump is controlled on the basis of the alarm signal received from that pump.

11. (currently amended) A method as defined in claim 1, wherein an alarm function is performed when the liquid surface level exceeds a selected alarm limit value that is later in the predetermined direction than the first value of the liquid surface level.

12. (previously presented) A method as defined in claim 1, wherein the method further comprises varying the first value of the liquid surface level in order to avoid that solid constituents in the liquid gather on the wall of the tank at any fixed surface level.

13. (currently amended) A frequency converter for a pump station, the pump station comprising a liquid tank, at least two pumps and electric drives for actuating the at least two pumps, the frequency converter comprising:

- means for storing a first value of liquid surface level,
- means for storing a first value of pump rotation speed, the first value of the pump rotation speed being

substantially a predetermined value at which an amount of transferred liquid relative to consumed energy is at maximum,

- means for measuring the liquid surface level on the basis of a signal received from a sensor,

- means for detecting a first moment when the liquid surface level reaches said first value of the liquid surface level from a predetermined direction,

- means for controlling the pump rotation speed of one of the at least two pumps to said first value of the pump rotation speed as a consequence of said detection of the first moment,

- means for running the one of said at least two pumps at the first value of the pump rotation speed in order to move the liquid surface level in a direction opposite to the predetermined direction,

- means for detecting a second moment when the liquid surface level reaches, from the direction opposite to the predetermined direction, another value of the liquid surface level that is later in the direction opposite to the predetermined direction than the first value of the liquid surface level,

- means for controlling, as a consequence of the detection of the second moment, the one of said at least two pumps to be stopped so as to keep the surface level between said first value and the other value of the liquid surface

level, the change of amount of liquid in the tank when the surface level changes between said first value and the other value of the liquid surface level being smaller than the whole volume of the tank, and

- means for controlling the at least two pumps in such a way that said at least two pumps are alternately in such operating turns in which the pump rotation speed is said first value of the pump rotation speed, wherein the means for controlling comprises means for transmitting control data to one or more other frequency converters of the pump station for controlling the operating turns of the at least two pumps.

14-15. (canceled)

16. (currently amended) A frequency converter as defined in claim 13, comprising means for storing a second value of the pump rotation speed and means for detecting a moment the liquid surface level reaches a second value of the liquid surface level from said predetermined direction, and means for controlling the pump rotation speed of the pump currently operating to the second value of the pump rotation speed as a consequence of this detection, the second value of the liquid surface level being later in the predetermined direction than the first value of the liquid surface level.

17. (previously presented) A frequency converter as defined in claim 16, wherein said second value of the pump rotation speed is the maximum rotation speed.

18-19. (canceled)

20. (previously presented) A frequency converter as defined in claim 13, comprising means for at least one of transmitting and receiving data indicating the liquid surface level to another frequency converter.

21. (previously presented) A frequency converter as defined in claim 13, comprising a memory unit for storage of said first value of the liquid surface level and the first value of the pump rotation speed and also for storage of a program for controlling the electric drive.

22. (previously presented) A frequency converter as defined in claim 13, comprising a measurement unit for receiving a signal from the sensor and for determining the liquid surface level on the basis of the received signal.

23. (previously presented) A frequency converter as defined in claim 13, comprising a terminal for connecting the sensor.



24. (previously presented) A frequency converter as defined in claim 13, comprising a processor for controlling the electric drives on the basis of data indicating the liquid surface level and on the basis of a program for controlling the processor.

25. (previously presented) A frequency converter as defined in claim 13, comprising means for receiving an alarm signal from alarm sensors of the at least two pumps and means for controlling the at least two pumps on the basis of the received alarm signal.

26. (currently amended) A frequency converter as defined in claim 13, comprising means for performing an alarm function if the liquid surface level exceeds a predetermined alarm limit value or if an alarm signal has been received from an alarm sensor of any of the at least two pumps, the predetermined alarm limit value being later in the predetermined direction than the first value of the liquid surface level.

27. (currently amended) A frequency converter as defined in claim 13, comprising software stored in the frequency converter for controlling the frequency converter to perform at least one of the following functions:

- measurement of the liquid surface level on the basis of a signal from the sensor and control of the rotation speed of the pump on the basis of the liquid surface level,

- variation of the first value of the liquid surface level in order to avoid that solid ingredients in the liquid gather on the wall of the tank at any fixed surface level,

- performing an alarm function when the liquid surface level exceeds a predetermined alarm limit value that is later in the predetermined direction than the first value of the liquid surface level, and

- monitoring alarm signals received from alarm sensors of the at least two pumps and controlling the at least two pumps on the basis of the alarm signals.